Designed for high-performance, scalable and simple-to-use small to medium-size SAN environments

IBM TotalStorage SAN16B-2 Express Model

High port-density design with 16 ports in an efficient 1U height helps save rack space

Highlights

- ***Simple-to-use SAN switch with ease-of-installation and ease-of-use features designed specifically for the needs of small to medium-size environments***
- ***Foundation for new infrastructure simplification and business continuity solutions for servers running Microsoft® Windows®, UNIX®, Linux® and NetWare® operating systems***
- ***High-performance 4 Gigabit per second links (requires storage hardware that supports 4 Gbps throughput) with pay-as-you-grow "Ports on Demand" scalability enables growth from 8 to 12 to 16 ports***

The IBM TotalStorage® SAN16B-2 Express Model fabric switch is designed specifically to address the needs of small to medium-size SAN environments. It can be used to create a wide range of high performance SAN solutions, from simple single-switch configurations to larger multi-switch configurations which support fabric connectivity and advanced business continuity capabilities. Infrastructure simplification solutions for IBM System x™, System i™ and System p™ servers include storage consolidation and high-availability server clustering with IBM TotalStorage disk storage arrays. Business continuity solutions include data protection with IBM TotalStorage tape libraries and devices and IBM Tivoli® Storage Manager data protection software.

A single SAN16B-2 Express Model switch can serve as the cornerstone of a Storage Area Network for those who want to obtain the benefits of storage

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consolidation and are just beginning to implement Fibre Channel storage systems. Such an entry-level configuration can consist of one or two Fibre Channel links to a disk storage array or to an LTO tape drive. An entry-level eight-port storage consolidation solution can support up to seven servers with a single path to either disk or tape. The Ports on Demand feature is designed to enable a base switch to grow to sixteen ports to support more servers and more storage devices without taking the switch offline.

A high-availability solution can be created with redundant switches. This capability is ideal for server clustering environments. Such a configuration can support from six to fourteen servers, each with dual Fibre Channel adapters cross-connected to redundant SAN16B-2 Express Model switches which are cross-connected to a dual-controller storage system.

While the focus of the SAN16B-2 Express Model is as the foundation of small to medium-sized SANs, it can be configured to participate as a full member in an extended fabric configuration with other members of the IBM TotalStorage SAN b-type family. This capability helps provide investment protection as SAN requirements evolve and grow over time.

Simple SAN configuration

The introduction of large capacity, high-availability storage systems offers new opportunities for cost reduction through storage consolidation and infrastructure and management simplification. In older environments each server accessed its own dedicated storage capacity using either internal disks that were contained within the server or disks which were part of an external system attached exclusively to that server. It has become difficult to sustain that approach as the requirement for both storage capacity and numbers of servers has increased. Storage consolidation is a fundamental objective of infrastructure simplification and is based on the philosophy that it is easiest to share and manage capacity contained in a large capacity, high-performance and high-availability external storage system such as provided by the IBM TotalStorage DS4000 family.

Fibre Channel Storage Area Networks (SANs) were developed to provide efficient, high performance access from many servers to many storage devices.

While it is possible in very small environments to direct-connect servers to external storage systems using fibre channel links, it is more common to configure a SAN switch between the servers and the storage system to enable multiple servers to share the same storage capacity. This simple SAN is depicted in Diagram #1 below.

The SAN16B-2 Express Model was designed specifically for use as the SAN switch in this type of configuration. It is easy to install and easy to manage. The tan, green and blue servers represent heterogeneous server types which are members of the same SAN and share capacity of the large disk system.

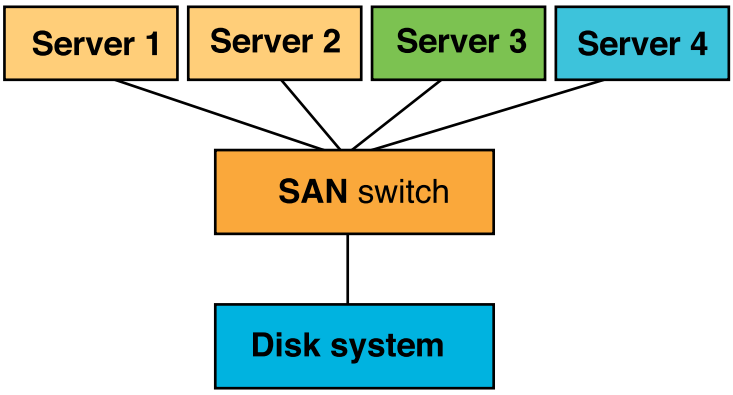

Diagram #1

The SAN16B-2 Express Model can be upgraded to 16 ports and is future-ready to support 4 Gbps servers and storage devices as they are introduced. Its flexible design allows participation with other SAN b-type switches in fabrics that evolve as requirements change. And it supports advanced functions to help enable participation in complex fabrics including cascaded switches and ISL trunks.

High availability SAN configuration

Many applications require continuous operation. A common design approach to achieve that objective is to run multiple instances of the application across a cluster of servers. When a server fails or must be taken offline for maintenance a backup server is available to help continue operation with a minimum of impact. Redundant paths to data are usually configured in a clustered server environment for the same reasons in an effort to help maintain access to data. Each server is configured with redundant Host Bus Adapters. And each Host Bus Adapter is connected to a different SAN switch, and each switch is connected to both controllers in a disk system. Every effort is made to help maintain application access to data.

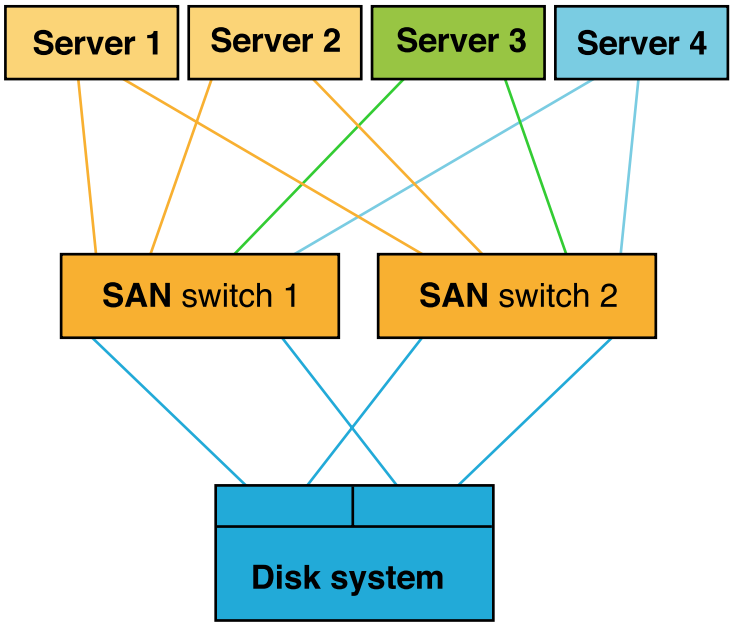

Diagram #2

The SAN16B-2 Express Model is an excellent switch to use in a clustered server environment. Separate SAN switches enable two separate SAN fabrics, which are desirable as a means to help minimize or eliminate single points of failure. The yellow and green clusters shown in Diagram #2 above provide redundant components at every level and are designed to help minimize application outages.

Business continuity solution

Many small and medium-size companies want to implement a business continuity or remote backup capability to help address strict new regulatory requirements. The SAN16B-2 Express Model fabric switch is designed to provide SAN connectivity for these environments. Diagram #3 on the following page is intended to represent two different sites. The blue side represents the production site and the green side represents the remote or backup site.

Many disk subsystems, including IBM TotalStorage DS6000 and DS4000 systems, are capable of copying data to a remote location. The data path for the remote copy operation is represented by the red links in the diagram. Two SAN16B-2 Express Model fabric switches can be connected over metro

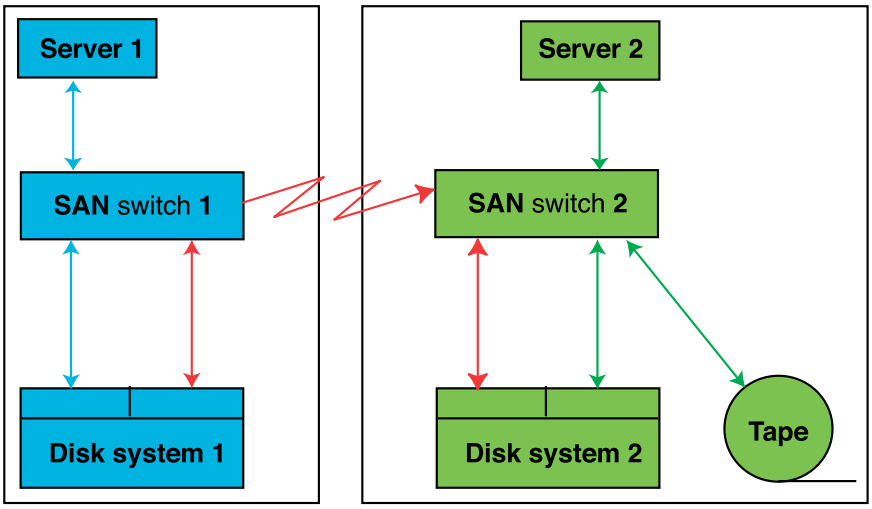

Diagram #3

distances (up to 35 km) using longwave SFP optical transceivers. Longer distances can be supported via extenders or repeaters or via converters (such as the IBM System Storage SAN18B-R router) which translate Fibre Channel Protocol (FCP) to Internet Protocol (IP).

SAN16B-2 Express Model fabric switches can also be used to connect two locations to enable remote data backup. An Information Lifecycle Management (ILM) application such as IBM Tivoli® Storage Manager (TSM) which runs on a server in the production site can write data to a tape system at a remote location. The same distance capabilities are available as for the business continuity solution described above.

Important characteristics

Easy to install and maintain

The SAN16B-2 Express Model includes features designed to make it easy to install and easy to maintain for system administrators who have minimal experience with SAN components. EZSwitchSetup wizard is an embedded setup tool designed for novice users to guide them through switch setup, often in less than five minutes. Advanced Web Tools (Web Tools EZ) provides intuitive graphic switch management capabilities. Advanced management functions are also available.

Pay-as-you-grow scalability

The Ports on Demand feature is designed to support scalable switch upgrades. The Ports on Demand feature provides an activation key which upgrades the switch in four-port increments while helping avoid fabric disruption. Small Form-factor Pluggable (SFP) transceivers are also required to connect additional links. The ability to increase switch capacity while maintaining service helps customers implement a pay-as-you-grow strategy while minimizing impact to applications.

High performance

The SAN16B-2 Express Model switch provides 4 Gbps performance on all ports (requires storage hardware that supports 4 Gbps throughput). Each port auto-negotiates to 4, 2 Gbps or 1 Gbps depending on the capabilities of the device at the other end of the fibre link. Performance up to 64 Gbps is possible with 16-port configurations. Network performance can be enhanced with Inter-Switch Link (ISL) Trunking, which combines up to 4 ports to provide a high-speed data path of up to 16 Gbps.

High-availability features

Small and medium-size businesses require high-availability switch fabric solutions. The SAN16B-2 Express Model fabric switch uses advanced application-specific integrated circuits (ASICs) to help minimize the number of internal components and thus improve reliability. Hot-pluggable optical transceivers (SFPs) are designed to be replaced without taking the switch offline.

Switch investment protection

SAN b-type switches and directors use common firmware—from the sixteen-port switch to the 256-port director—which helps simplify SAN fabric expansion. Common firmware supports forward and backward interoperability of the SAN16B-2 Express Model switch and helps simplify deployment with existing SAN infrastructures. ISL trunking can interoperate with existing 2 Gbps switches. Since the SAN16B-2 Express Model switch can operate at up to 4 Gbps, it is ready to operate with future 4 Gbps capable server adapters and storage devices when they become available.

Multiple management options

In addition to Web Tools EZ, the SAN16B-2 Express Model fabric switch provides advanced options to help manage the SAN. Switch fabric management is available through various interfaces including GUI, SNMP, Telnet and serial port. Remote access and remote management is also available.

Advanced Zoning

Advanced Zoning provides hardware-enforced zoning that helps protect against unauthorized or unauthenticated storage network access, non-secure management access and World Wide Name (WWN) spoofing.

Optional features

B16 4-Port Express Model Activation

Enables upgrade from 8 to 12 to 16 ports. The base model activates the first eight ports (0 to 7). The first 4-Port Activation feature activates ports eight to eleven (first four-port increment) and the second 4-Port Activation feature activates ports twelve to fifteen (second four-port increment).

B16 Full Fabric Activation

The switch by default can connect to servers and storage. Full Fabric Activation is required to enable E-Ports capability to allow connection to other switches via Inter-Switch Links (ISLs). Full Fabric Activation is a prerequisite to Advanced Security Activation, Performance Bundle Activation and Performance Monitoring.

B16 Extended Fabric Activation

Extended Fabric Activation enables the Extended Fabric capability within the SAN16B-2 Express Model firmware. Extended Fabric is designed to provide extensions within switch internal buffers to maintain performance over distances between ten and eighty kilometers by maximizing data buffering on switch interconnect links (ISLs).

B16 Fabric Watch

Fabric Watch is designed to enable real-time proactive awareness of the health, performance and security of each switch and automatically alert network managers of problems in order to avoid failures.

B16 Advanced Security Activation

Advanced Security Activation is designed to enable policy-based security mechanisms integrated with Fabric Operating System. All switches and directors within the SAN fabric must be configured with their respective Advanced Security Activation feature.

B16 Performance Monitoring Activation

Performance Monitoring Activation helps to identify end-to-end bandwidth usage by host/target pairs and is designed to provide information for capacity planning.

B16 Enhanced Trunking Activation

Enhanced ISL Trunking is supported between a SAN16B-2 Express Model, a SAN16B-2, a SAN32B-2 Express Model, a SAN32B-2, a SAN64B-2 or a SAN256B and enables Fibre Channel (FC) Packets to be distributed across up to four 4 Gbps capable ISLs for a combined bandwidth of up to 16 Gbps. ISL trunking eliminates rerouting and possible application downtime arising from link failure.

IBM TotalStorage SAN16B-2 Express Model at a glance

Product characteristics	
Product Number	200516B
Base fabric switch	IBM TotalStorage SAN16B-2 Express Model fabric switch with 16 ports, 8-ports activated (0 to 7), hardcopy install guide, CD-ROM (with manuals), service and wrap tools, rack 240 V PDU power cord and mount kit
Fibre Channel interfaces	E-Port, F_Port, FL-Port
Optical transceivers	4, 2 and 1 Gigabits per second (Gbps) short wave and long wave
Fans and power supplies	Dual fans, one power supply
Hot-swap components	SFP optical transceivers
Rack support	19 inch, 1U industry standard rack
Non-rack support	Non-rack installation is supported; required country-specific power cords must be ordered
Management software	Advanced Zoning, Web Tools EZ
Servers supported*	IBM System x Other Intel® processor-based servers IBM System p IBM System i Selected Sun™ and HP servers
Operating systems supported*	Microsoft Windows NT®, Windows 2000, Windows 2003 Red Hat Linux, Red Hat Linux Advanced Server SUSE Linux, SUSE Linux Enterprise Server (SLES) United Linux Novell® NetWare®
Storage products supported*	IBM TotalStorage DS8000 and DS6000 storage servers IBM TotalStorage Enterprise Storage Server® systems IBM TotalStorage DS4000 servers IBM TotalStorage 3580, 3588, 3590 and 3592 tape drives IBM TotalStorage 3581 Tape Autoloader IBM TotalStorage 3494, 3582, 3583 and 3584 tape libraries and 3584 High Availability Frame Model HA1 IBM TotalStorage SAN Volume Controller (SVC) IBM TotalStorage SAN File System (SFS) Other selected storage systems
Fibre Channel switches supported	IBM TotalStorage SAN b-type switches and directors Other switches and directors manufactured by Brocade
Fibre optic cable	Fibre optic cables are required and are available in various lengths in single mode and multi-mode formats
Warranty (standard)	1-year; Customer Replaceable Unit (CRU) Service and IBM On-site Repair; warranty service upgrades are available
Optional features	B16 4-Port Activation B16 Full Fabric Activation B16 Extended Fabric B16 Fabric Watch B16 Advanced Security Activation B16 Performance Monitoring B16 Trunking Activation

* Refer to **ibm.com**/servers/storage/san/b_type/ for the most current and complete details.

IBM TotalStorage SAN16B-2 Express Model at a glance

Physical characteristics	
Height (rack mount)	4.29 cm / 1.69 in (1U)
Width	42.85 cm / 16.87 in
Depth	30.73 cm / 12.10 in
Weight	8.8 lbs
Operating environment	
Temperature	-10° C to 40° C/14° F to 104° F
Relative humidity	20% to 85%
Electrical requirement	
Power	110-230 VAC, 47-63 Hz

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